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EXAMINER

BARAN, MARY C

ART UNIT

PAPER NUMBER

2857

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary

Application No.

09/845,231

Applicant(s)

HALLIYAL ET AL.

Examiner

Mary Kate B. Baran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
 Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2005.
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 28, 29 and 35-37 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 1-5, 28, 29 and 35-37 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☒ The drawing(s) filed on 30 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) ☐ Notice of Informal Patent Application (PTO-152)
 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The action is responsive to the Amendment filed on 11 April 2005. Claims 1-5, 28, 29 and 35-37 are pending. Claims 1-5, 28, 29 and 35-37 have been amended. Claims 6-27 and 30-34 have been cancelled.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4, 5 and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maguire et al. (U.S. Patent No. 6,038,525) (hereinafter Maguire) in view of Robinson et al. (U.S. Patent No. 6,541,783) (hereinafter Robinson).

Referring to claim 1, Maguire teaches a system for controlling a thin film deposition process, comprising: one or more thin film components that deposit a thin film on one or more portions of a wafer (see Maguire, Figure "Begin Deposition of Film"); a thin film deposition component driving system for driving the one or more deposition components (see Maguire, column 3 lines 7-15); a system for directing light on to the deposited thin film and collecting light reflected from the deposited thin film (see Maguire, Figure 8, "Acquire Response Data"); a scatterometry system that detects structural irregularities associated with the deposited thin film by comparing reflected

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light data associated with the deposited thin film with a database comprising known thin film reflecting light signatures (see Maguire, Figure 8, column 4 lines 12-27); and a processor that communicates with the scatterometry system and the thin film deposition component driving system, wherein the processor determines deposition parameter adjustments to the one or more deposition components based at least in part upon data received from the scatterometry system (see Maguire, Figure 8, column 5 lines 61-67), but does not teach that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks.

Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Maguire to include the teachings of Robinson because partitioning the mask and determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

Referring to claim 2, Maguire teaches that the scatterometry system captures the light reflected from the thin film (see Maguire, column 3 lines 42-52).

Referring to claim 4, Maguire teaches that the processor determines the deposition parameter adjustments based in part (see Maguire, column a6 lines 1-6) on

a presence of an unacceptable thin film deposition condition for a portion of the wafer according to the data received from the monitoring system (see Maguire, column 6 lines 13-21), but does not specify that the "portion of the wafer" refers to a "grid block."

Robinson teaches that the processor makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Maguire to include the teachings of Robinson because determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

Referring to claim 5, Maguire teaches that the deposition parameter adjustments comprise at least one of pressure (see Maguire, column 6 lines 23-31), flow rates of reacting species (see Maguire, column 5 lines 61-67), flow rate of carrier gas (see Maguire, column 6 lines 1-6), and temperature or a combination thereof (see Maguire, column 6 lines 1-6).

Referring to claim 35, Maguire teaches a method for regulating a process for depositing a thin film (see Maguire, column 2 lines 39-48), comprising: using one or more deposition components to deposit a thin film (see Maguire, Figure 8); determining the characteristics of the deposited thin film utilizing reflected light and comparing to known thin film reflected light signatures (see Maguire, Figure 8); and using a processor to coordinate control of the one or more deposition components to deposit subsequent

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thin film based at least in part of the characteristics of the deposited thin data gathered from comparing the reflected light to known thin film light signatures (see Maguire, Figure 8, column 5 lines 61-67), but does not teach that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks.

Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Maguire to include the teachings of Robinson because partitioning the mask and determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

Referring to claim 36, Maguire teaches a system for regulating a process for depositing a thin film (see Maguire, column 2 lines 39-48), comprising: means for using one or more deposition components to deposit a thin film (see Maguire, Figure 8); means for determining the acceptability of the thin film deposition utilizing reflected light and comparing to known thin film reflected light signatures (see Maguire, Figure 8); and means for using a processor to coordinate control of the one or more deposition components to deposit the thin film a processor based at least in part of the acceptability of the thin film deposition as determined by comparing the known thin film

signatures to reflected light (see Maguire, Figure 8, column 5 lines 61-67), but does not teach that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks.

Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Maguire to include the teachings of Robinson because partitioning the mask and determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

Referring to claim 37, Maguire teaches a system that control the deposition of a thin film of a wafer (see Maguire, column 2 lines 39-48), comprising: at least one deposition component employed to deposit a thin film of a wafer (see Maguire, Figure 8); a coherent light source directed onto the thin film (see Maguire, column 3 lines 28-41); a receiving component that collects light reflected from the thin film (see Maguire, column 3 lines 42-49); a scatterometry system that analyzes the reflected light to determine one or more properties of the thin film (see Maguire, column 3 lines 46-52); and a processor that controls the at least one deposition component based at least in part on data received from the scatterometry system (see Maguire, Figure 8, column 5 lines 61-67), but does not teach that the processor partitions the mask into a plurality of

grid blocks and makes a determination of deposition conditions at the one or more grid blocks.

Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Maguire to include the teachings of Robinson because partitioning the mask and determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maguire et al. (U.S. Patent No. 6,038,525) (hereinafter Maguire) in view of Robinson et al. (U.S. Patent No. 6,541,783) (hereinafter Robinson) and further in view of Moslehi (U.S. Patent No. 5,270,222).

Referring to claim 3, Maguire teaches all the features of the claimed invention except that structural irregularities associated with the thin film include large grains.

Moslehi teaches that structural irregularities associated with the thin film include large grains (see Moslehi, column 14 lines 58-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Maguire to include the teachings of Moslehi because

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detecting large grains would have allowed the skilled artisan to generate a diagnosis or prognosis of any fabrication process abnormalities (see Moslehi, column 3 lines 48-57).

4. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maguire et al. (U.S. Patent No. 6,038,525) (hereinafter Maguire) in view of Gevelber et al. (U.S. Patent No. 6,162,488) (hereinafter Gevelber) and further in view of Robinson et al. (U.S. Patent No. 6,541,783) (hereinafter Robinson).

Referring to claim 28, Maguire teaches a method for monitoring and controlling the deposition of a thin film (see Maguire, column 2 lines 39-48)), comprising: depositing a thin film on a wafer (see Maguire, Figure 8 "Begin Deposition of Film"); directing a light onto the thin film (see Maguire, column 3 lines 28-41); collecting a light reflected from the thin film (see Maguire, column 3 lines 42-49); employing scatterometry means to analyze the reflected light to determine one or more properties of the thin film (see Maguire, column 3 lines 46-52); monitoring structural irregularities associated with the deposited thin film by comparing reflected light data associated with the deposited thin film with a database comprising known thin film reflected light signatures (see Maguire, column 4 lines 12-27); and controlling a deposition component to deposit thin film on the wafer; and using a processor to control the at least one deposition component based at least in part on data received from the scatterometry means (see Maguire, Figure 8, column 5 lines 61-67). Maguire does not teach utilizing a non-linear training system which facilitates determining deposition parameter adjustments according to the properties of the thin film; or that the processor partitions the mask into a plurality of grid

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blocks and makes a determination of deposition conditions at the one or more grid blocks.

Gevelber teaches utilizing a non-linear training system which facilitates determining deposition parameter adjustments according to the properties of the thin film (see Gevelber, column 16 lines 2-22 and column 17 lines 56-65).

Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Maguire to include the teachings of Gevelber because having a non-linear system would have allowed the skilled artisan to operate the deposition system over a wide range of operating conditions (see Gevelber, column 19 lines 31-36), and further in view of Robinson because partitioning the mask and determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

Referring to claim 29, Maguire teaches that the properties include at least one of thickness (see Maguire, column 6 lines 13-21).

Response to Arguments

5. Applicant's arguments filed 11 April 2005 have been fully considered but they are not persuasive.

Applicant argues that Maguire does not teach that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks. However, this limitation is met by Robinson. Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B. Baran whose telephone number is (571) 272-2211. The examiner can normally be reached on Monday - Friday from 9:00 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (571) 272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

14 June 2005

Hal Wachsman
HAL WACHSMAN
PRIMARY EXAMINER
AU2857